

NATIONAL RESEARCH COUNCIL  
COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND APPLICATIONS

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BOARD ON  
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May 5, 1994

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

Ms. Donna R. Searcy  
Secretary  
Federal Communications Commission  
1919 M Street, N.W.  
Washington, D.C. 20554

Re: CC Docket No. 92-166

In the Matter of

Amendment of the Commission's Rules to Establish  
Rules and Policies Pertaining to a Mobile Satellite  
Service in the 1610-1626.5 and 2483.5-2500 MHz  
Frequency Bands

Dear Ms. Searcy:

Transmitted herewith by the Committee on Radio Frequencies, operated by the National Research Council for the National Academy of Sciences, are an original and nine (9) copies of its Comments to the Notice of Proposed Rulemaking in the above-referenced proceedings.

If additional information is required concerning this matter, please communicate with this office.

Sincerely yours,

*Robert L. Riemer*

Robert L. Riemer  
Senior Program Officer

Enclosure

cc: Members of CORF

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No. 92-166

The recommendations of the Committee have been incorporated, in principle, in the instant Notice of Proposed Rulemaking (NPRM). And CORF supports all those principles as a way to protect radio astronomy while giving the maximum amount of flexibility to the MSS. However, CORF is concerned over the inadequate protection that would be afforded to radio astronomy by the present wording of §§25.213(a)(i), (ii), and

(v) by which the Commission proposes to implement certain of the Committee's unanimous recommendations. CORF is also concerned about the possible ambiguous interpretation of §25.213(a)(v).

Radio Regulation 733E (adopted at WARC-92 and incorporated in the U.S. Table of Frequency Allocations by R&O, FCC 93-547, December 13, 1993), states that:

Harmful interference shall not be caused to stations of the radio astronomy service using the band 1610.6 - 1613.8 MHz by stations of the radiodetermination-satellite service and the mobile-satellite services.

Since that Radio Regulation applies to all the sub-bands comprising the 1610.0 - 1626.5 MHz band, the clear intent of the regulation is to protect stations of the radio astronomy service from emissions of MES operating anywhere in the 1610.0 - 1626.5 MHz band, not just within the 1610.6 - 1613.8 MHz portion of that band. But proposed §§(a)(i) and (a)(ii) would protect radio astronomy observatories only from MES transmitting in the band 1610.6 - 1613.8 MHz. The first and major concern of CORF is that MES operating above 1613.8 MHz can also cause interference to radio astronomy observations, as agreed by the Committee in its final report, and discussed by the Commission in §51. But the proposed rules do not impose any restriction on MES operating in this adjoining band. Out-of-band emissions from an MES in the vicinity of an observatory operating at or somewhat above the band edge, 1613.8 MHz, can cause unacceptable interference to that observatory.

Out-of-band emission limitations on MES operating on frequencies adjacent to this radio astronomy band would not be unusual. For many years, the Commission has had such out-of-band limits throughout the radio frequency spectrum to protect services much less sensitive to interference than radio astronomy. For instance, in this same part of the spectrum, the rules require that the peak power of the video carrier of an Instructional Television Fixed Service transmitter be attenuated by 60 dB at all frequencies more than 1 MHz below the lower band edge.

The Recommendations of the Negotiated Rulemaking Committee recognized the need for protection of RAS from out-of-band MES

transmissions (§6.1), and described two alternative approaches to provide this protection: protection zones of prescribed, but smaller radius than those for in-band MES operations; and separation distances based on the level and transmitter filter characteristics of actual MES in the individual MSS systems that may come into operation.

The first method, a smaller but arbitrary protection zone, is easy to apply, but it discriminates against those system operators who have taken the pains to design, and pay for, MES with good out-of-band emission characteristics. The second method has the disadvantage of being complicated and difficult to implement and enforce. As the consequence, the Committee did not recommend a specific method to limit out-of-band emissions. But these emissions must be limited in some way: even an MES of "reasonably good" design, operating on a public highway close to an observatory, and transmitting on the first MSS channel above 1613.8 MHz, can cause much more (and intolerable) interference to that RAS than an MES at the edge of the protection zone operating within the band 1610.6-1613.8 MHz. The closer, out-of-band MES has an interference power advantage of as much as 60 dB over the distant, in-band one!

In view of the difficulty of establishing a fair, protective, and enforceable limit on out-of-band MES emissions, CORF urges the Commission to adopt two alternative methods as interim measures. Either method could be employed at the option of the MSS system operator. During the next few years, as MSS licensees specify, design, and test MES, the interference potential of such terminals will become better known. Thus, there will be sufficient time for parties to propose, and for the Commission to consider, permanent rules to control out-of-band interference, before the widespread manufacture, distribution and operation of these terminals.

The first alternative, interim method proposed by CORF is the establishment of smaller protection zones for MES emissions in a small band segment above 1613.8 MHz. Specifically, for all MES operating in the 2 MHz band 1613.8 - 1615.8 MHz, CORF proposes a protection zone of

only 100 km in radius around the observatories identified in §25.213(a)(i), and a protection zone of only 30 km around the observatories identified in §25.213(a)(ii).

The second alternative, interim method is one that requires the operator to insure that the power flux density (PFD) reaching the observatories identified in §§25.213(a)(i) and (ii) shall not exceed the PFD from an MES operating within the 1610.6 - 1613.8 MHz band at the edge of the protection zone applicable for that site. Operators can achieve this limit by taking into account the actual e.i.r.p., filter characteristics, and distance from the observatory of an MES requesting a frequency assignment.

During the design and test period during which the interim rules proposed by CORF would be in effect, it might be found that the out-of-band characteristics of typical MES would permit smaller protection zones and/or a smaller guard band.

CORF's second concern relates to §25.213(a)(v). The proposed rule states:

The [Electromagnetic Spectrum Management Unit (ESMU) of the National Science Foundation] shall notify mobile-satellite service space station licensees authorized in the 1610.6-1613.8 MHz band of periods of radio astronomy observations. The mobile-satellite system shall be capable of terminating operations in this band within the first position fix of the mobile terminal prior to transmission, or as soon as practicable after entering the protection zone.

But this section does not make clear what operations are to be terminated. It is only those Mobile Earth Stations that are within, or enter into an exclusion zone, which must be prevented from operating on a frequency in the shared band and on adjacent bands. The MSS system itself, including all other MES, can continue operations as usual, and the rules should make that clear.

The third concern of CORF relates both to the wording used in §25.213(a)(i) which prohibits operation of MES in the band 1610.6 - 1613.8 MHz "during periods of radio astronomy observations," and the method of notification of observation schedules set forth in §25.213(a)(v). In its submissions to the Committee, CORF itself

recommended that MES operations in the vicinity of an observatory be restricted only at times when observations were scheduled at that observatory. CORF further offered to make observation schedules available at a central location and to keep them up to date so that MSS operators could make maximum use of frequencies in and near the band segment shared with the Radio Astronomy Service (RAS) at all other times and in all other places. Those offers were incorporated in the recommendations of the Committee, and CORF is fully committed to providing that information.

However, by the Commission's use of the phrase "during periods of radio astronomy observations," rather than the phrase "during periods when radio astronomy observations are scheduled," leaves the RAS open to interference from one or more MSS operators who might make their own incorrect determination that no observations were being made at a particular time.

Moreover, the wording in proposed §25.213(a)(v) could easily be interpreted to require the ESMU to individually notify a potentially large number of MSS space station licensees of these periods of observations, rather than maintaining a single information source that could be queried periodically and automatically by all the operators themselves. Maintaining a single point of information will also avoid the complication of the possibly different formats in which each MSS licensee would like to receive this scheduling information.

Therefore CORF proposes that the wording of §25.213(a) be amended to read:

(a) Protection of the radio astronomy service against interference from mobile-satellite service systems in the ~~1610.6—1613.8 MHz~~ 1610.6-1626.5 MHz band.

(1) Protection zones....Global Positioning System. During periods of ~~radio astronomy observations when~~ radio astronomy observations have been scheduled, land mobile earth stations shall not operate ~~in the 1610.6—1613.8 MHz frequency band~~ when located within the geographic protection zones defined by the radio observatory coordinates and separation distances as follows:

(i) In the band 1610.6 - 1613.8 MHz, within a 160 km radius of the following radio astronomy observatory sites:

[Present list of sensitive sites, no change].

(ii) In the band 1610.6 - 1613.8 MHz, within a 50 km radius of the following radio astronomy observatory sites:

[Present list of less sensitive sites, no change].

(iii) Out-of-band emissions of an MES operating anywhere within the 1610.0 - 1626.5 MHz, will be attenuated so that the power flux density it produces in the 1610.6 - 1613.8 MHz band at a radio astronomy site listed in (i) and (ii) shall not exceed the emissions of an MES operating within the 1610.6 - 1613.8 MHz band at the edge of the protection zone applicable for that site. As an alternative, MES operating within the 1613.8 - 1615.8 MHz band shall not operate within 100 km of the radio astronomy sites listed in (i) above, and within 30 km of the sites listed in (ii) above, there being no restriction on MES operating within the 1615.8 - 1626.5 MHz band.

[renumber (iii) - (vii)]

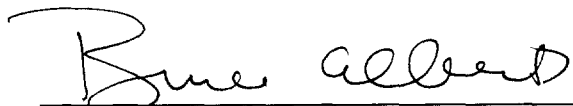
Existing §25.231(1)(v) should be amended as follows:

(v) The ESMU shall notify mobile satellite service space station licensees authorized to operate in the 1610.6 - 1613.8 MHz band of periods of radio astronomy observations. maintain a current schedule of the periods and locations of radio astronomy observations in the band 1610.6 - 1613.8 MHz. The schedule shall be available, preferably in computer readable format, for consultation by MSS system operators. The mobile-satellite system shall be capable of terminating operations in this band preventing the operation of mobile earth stations within the protection zone specified in (i), (ii) or (iii) above, on any frequency in the 1610.6 - 1615.8 MHz band within the first position fix of the mobile terminal prior to transmission or as soon as practicable after entering a protection zone.

Respectfully submitted,

NATIONAL ACADEMY OF SCIENCES'  
COMMITTEE ON RADIO FREQUENCIES

By:

  
Dr. Bruce Alberts  
President

May 5, 1994

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